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Trends in Educational Attainment and Field of Study Among Adults in the European Union

By Elvira NICA[1], Cristina DIMA[2], Oana Cătălina DUMITRESCU[3], Petrică Sorin ANGHELUȚĂ[4]

ABSTRACT:
Given the evolution of the labor market, adult participation in vocational education and training programs is becoming increasingly important. For the period 2013-2023, the article presents the comparative situation of this indicator. The values for both employed and unemployed people are analyzed. Thus, the level and type of skills held by people are influenced. Technological changes lead to the need for many people to update their skills. Jobs that require low levels of education are increasingly rare. For communities where the level of education of people has increased, an increase in productivity has also been observed. Completing a higher level of education offers a superior possibility of finding a safer and better-paid job. A higher share of people with a tertiary education level creates premises for the development of a community. The article presents the analysis of the evolution of the share of the adult population with tertiary education attainment. The degree of employment on the labor market can also be influenced by the fields of education. Thus, the fields of education of bachelor's, master's and doctoral graduates are analyzed.

Keywords: graduates, bachelor, master, doctoral, participation rate in education and training, European Union

1. Introduction

An important aspect, with implications for society, is the aging of the population. This phenomenon also has effects on people's lives. The changing relationship between retirees and people of working age, as well as the shortage of labor, lead to measures to extend working lives. But for this it is necessary that individuals can acquire new skills, respectively update their skills (Radulescu et al, 2021). Participation in the digital transformation of work can be done through training or learning activities (Heuer et al., 2025). In environments adapted for smart production, to overcome the difficulties of integrating the workforce, training plays an important role, as well as multidisciplinary teamwork (Nica et al., 2023).
The existence of better employment opportunities throughout working life, as well as increased economic security, can be provided by increasing the educational level (Martin et al., 2025).
The use of new technological resources for learning contributes to quality education. Investments in technological infrastructure, as well as the involvement of teachers and

[1, 2, 3, 4] Bucharest University of Economic Studies, Romania.

families, can develop educational practices that create learning experiences (Willis et al., 2025)
Competitiveness has led to the introduction of new products and services by organizations (Angheluta et al., 2021). These have constituted challenges, but also new opportunities. The adoption of innovation is encouraged by those characteristics that allow the adoption of good innovative business management (Juracka et al., 2024).
Artificial intelligence can participate in interactive, personalized intelligent guidance. It can also provide databases, as support for teachers, but can also perform automated administrative tasks. These innovations can contribute to making real-world connections and building social knowledge (Vargas et al., 2024).
The development of individuals for life is achieved through the increasing use of digital technologies in education. Development measures that consider human capital, through preparation for employment and the acquisition of skills, must consider both urban and rural populations (Ruiz and Gallagher, 2025).

2. Literature review

Proactive career development behavior and career confidence can be increased through work-integrated learning (Jackson et al., 2024).
Knowledge management can be improved through measures to facilitate and make learning and knowledge sharing more flexible (Zhao et al., 2024).
Adult learners' preparation and attitudes are influenced by their prior knowledge, experience, and educational skills and experiences (Sheridan et al., 2025).
The adoption of new technologies requires a sufficiently educated workforce that contributes to technological innovation, as well as to the transition from stagnation to growth. At the same time, for a society, the transition to modern growth, but also to post-transition economic performance, is influenced by the composition of human capital. Thus, the composition of human capital and the cost of education influence long-term economic growth (Carillo, 2024).
Artificial intelligence can contribute to changing evaluation processes. It is believed that the transformation of education can be done with the help of chatbots. They can contribute to improving educational resources and reducing the workload of educators. At the same time, the motivation of learners, as well as increasing their performance, can be favored with the help of artificial intelligence chatbots (Gokcearslan et al., 2024).
Thus, in many human resources departments, the human factor is taken into account for organizational security. Addressing psychological factors can contribute to actions taken against cyber threats (Nica et al., 2024).
Learners have certain individual characteristics. In this regard, there may be similarities in cognitive abilities between people of different ages. These individual characteristics influence cognitive abilities throughout life. It is believed that, throughout life, the maintenance and development of cognitive abilities is affected by cognitive skills (Maehler et al., 2024).
Thus, literacy should be approached in the context of workforce training. This involves using models that encompass more than just reading and writing, or more than the ability to write one's name. The increasing prioritization of adult education makes this type of

approach increase the effectiveness of program delivery and participation outcomes (Grotlüschen et al., 2025).
In the context of lifelong learning, the well-being of older adults can be improved by promoting a focused and dynamic commitment to the present. Adults' outcomes and experiences are influenced by learning processes (Burlacu, Angheluta et al., 2021). This is both in terms of time and pace, as well as in terms of their history and duration. Therefore, supporting lifelong learning can be achieved by applying flexible formal and informal educational systems. These can adapt to the various temporal needs of individuals. In this way, we can talk about the efficiency of education systems, which respond to the needs of learners (Brandi et al., 2025).
In terms of the application of knowledge, but also of the way in which it is constructed, the way of understanding and the attitude of individuals are changing. In this sense, even if there are differences in public recognition and prestige, universities have an extraordinary potential. In these situations, it is considered that diplomas on the labor market have different exchange value (McCowan, 2023).
Thus, regional development as well as balanced economic growth can be promoted with the help of the digital economy. Competitive pressure can be alleviated through entrepreneurial dynamism and trade openness. Also, in regions where economies are less developed, with poorer innovation environments, the digital economy has more pronounced mitigating effects (Miao et al., 2024).

3. Methodology of research

Even if a lack of skills is found in a certain field, by participating in education and training programs this aspect can be mitigated. Thus, considering the participation rate in education and training, the article presents the comparative situation of this indicator. The more the implementation of automation and new technologies in production processes has increased, the more the interest and need to have a high level of training has increased. The comparative situation of the share of the adult population with tertiary education attainment is presented, for the period 2013-2023. In the situation where a community intends to develop a field, the existence in that community of people with higher training in that field offers the possibility of obtaining superior results. Under these conditions, the distribution of graduates by education levels (bachelor, master and doctorate) is an advantage for the labor market. This distribution is presented in the analysis.

4. Results and discussions

An important indicator regarding the participation of adults in the education and training process is the participation rate in education and training. The following table presents the comparative situation of the participation rate in education and training for all persons aged between 25 and 64, for the period 2013-2023.

Table 1 - Comparative situation of participation rate in education and training for people aged 25 to 64 (%), 2013-2023.

Countries	2013			2023		
	total	male	female	total	male	female
European Union	9,9	9,0	10,7	12,8	11,6	14,0
Belgium	6,9	6,7	7,1	11,1	10,4	11,7
Bulgaria	2,0	1,9	2,1	1,4	1,3	1,6
Czechia	10,0	10,0	9,9	9,9	9,3	10,5
Denmark	31,5	25,8	37,2	30,5	25,7	35,3
Germany	7,9	7,9	7,9	8,3	7,9	8,6
Estonia	12,6	9,8	15,3	23,2	17,9	28,4
Ireland	7,6	7,2	7,9	12,3	10,3	14,3
Greece	3,2	3,3	3,1	3,4	3,4	3,4
Spain	11,4	10,5	12,2	15,8	13,9	17,7
France	17,8	15,5	20,0	14,9	12,5	17,1
Croatia	3,3	3,1	3,5	6,4	5,9	6,9
Italy	6,2	5,8	6,5	11,6	11,3	11,8
Cyprus	7,2	7,0	7,4	10,9	10,8	10,9
Latvia	6,8	5,1	8,2	10,7	7,8	13,5
Lithuania	5,9	5,2	6,5	10,7	8,5	12,9
Luxembourg	14,6	14,0	15,2	16,2	14,9	17,5
Hungary	3,2	3,1	3,2	9,5	8,5	10,6
Malta	7,7	7,4	8,0	16,4	15,1	18,1
Netherlands	17,9	17,4	18,4	26,4	25,1	27,7
Austria	14,1	12,8	15,4	17,1	15,5	18,6
Poland	4,3	3,8	4,9	8,7	7,9	9,5
Portugal	9,7	9,3	10,1	13,3	12,6	14,0
Romania	2,0	2,2	1,8	6,7	6,8	6,5
Slovenia	12,5	10,5	14,6	19,9	17,9	22,1
Slovakia	3,1	2,9	3,3	10,5	10,7	10,4
Finland	24,9	21,1	28,8	26,1	22,3	30,1
Sweden	28,4	21,5	35,5	38,8	31,7	46,1

Source: processing according to data published by EUROSTAT, 2025

For the total population aged 25 to 64, at the European Union level, in 2023 compared to 2013, an increase in the participation rate is observed from 9.9% to 12.8%. However, there are several countries where the participation rate has decreased: Bulgaria (0.6%), Czechia (0.1%), Denmark (1.0%), France (2.9%), but also countries where the values of this indicator have increased substantially: Estonia (10.6%), Sweden (10.4%). In 2023, the highest values were recorded in: Sweden (38.8%), Denmark (30.5%), Netherlands (26.4%). For males, the values are similar. For females, the difference compared to males is given by the high weights for Finland (30.1%).

Considering employed persons, table 2 presents the comparative situation of participation rate in education and training for Employed persons aged between 25 and 64 years, for the period 2013-2023.

Table 2 - Comparative situation of participation rate in education and training for employed persons aged between 25 and 64, for the period 2013-2023.

Countries	2013			2023		
	total	male	female	total	male	female
European Union	10,5	9,1	12,2	13,6	11,8	15,6
Belgium	7,1	6,8	7,4	11,3	10,5	12,1
Bulgaria	1,5	1,4	1,7	1,0	1,0	1,1
Czechia	11,4	10,6	12,3	10,8	9,7	12,2
Denmark	32,1	26,1	38,8	31,4	26,1	37,2
Germany	7,8	7,3	8,3	8,1	7,5	8,7
Estonia	13,7	10,3	17,1	24,6	19,0	30,4
Ireland	6,3	5,4	7,4	12,4	10,1	15,0
Greece	3,0	2,6	3,5	2,7	2,3	3,2
Spain	11,4	10,1	12,9	16,0	13,7	18,8
France	19,8	17,1	22,7	16,0	13,4	18,7
Croatia	2,8	2,4	3,3	6,7	6,0	7,5
Italy	6,1	5,3	7,2	13,0	11,7	14,8
Cyprus	7,8	6,9	8,7	12,0	11,6	12,4
Latvia	7,1	5,4	8,8	11,7	8,2	15,0
Lithuania	6,9	6,1	7,7	12,2	9,7	14,7
Luxembourg	15,3	13,9	17,2	17,1	15,3	19,1
Hungary	3,1	2,7	3,6	10,5	8,8	12,5
Malta	9,6	7,9	12,3	18,2	15,6	22,0
Netherlands	19,8	18,5	21,3	28,2	26,1	30,5
Austria	14,8	12,8	17,0	18,2	16,0	20,6
Poland	5,1	4,2	6,2	10,0	8,6	11,6
Portugal	9,6	8,9	10,4	13,6	12,6	14,6
Romania	1,7	1,7	1,6	8,6	7,9	9,7
Slovenia	14,0	11,6	16,8	22,5	19,9	25,5
Slovakia	3,3	2,9	3,7	11,9	11,8	12,1
Finland	27,0	23,1	31,3	26,4	22,5	30,6
Sweden	27,3	19,8	35,5	38,3	30,6	46,7

Source: processing according to data published by EUROSTAT, 2025

It is found that, for both the total Employed persons and for male persons, the countries with the highest values are: Sweden, Denmark, Netherlands. As for female persons, the countries with the highest participation rate were: Sweden (46.7%), Denmark (37.2%), Finland (30.6%).

The following table presents the comparative situation of participation rate in education and training for Unemployed persons aged between 25 and 64 years, for the period 2013-2023.

Table 3 - Comparative situation of participation rate in education and training for Unemployed persons aged between 25 and 64 years, for the period 2013-2023.

Countries	2013			2023		
	total	male	female	total	male	female
European Union	9,8	8,3	11,5	14,1	12,2	16,0

Countries	2013			2023		
	total	male	female	total	male	female
Belgium	8,4	7,9	9,2	13,6	12,7	14,7
Bulgaria	1,9	:	2,5	:	:	:
Czechia	5,4	4,6	6,1	5,4	4,4	6,3
Denmark	33,0	31,0	34,8	33,5	31,0	36,0
Germany	5,9	5,0	7,0	12,0	10,6	13,7
Estonia	13,4	9,4	18,2	25,0	16,8	32,4
Ireland	7,1	5,9	8,7	18,8	14,6	24,0
Greece	3,1	3,1	3,2	4,2	4,9	3,7
Spain	13,6	12,0	15,4	18,6	16,1	20,6
France	14,6	11,6	18,0	15,1	12,5	17,7
Croatia	1,6	1,6	1,7	5,6	6,1	5,2
Italy	5,1	3,9	6,5	6,9	6,1	7,6
Cyprus	6,0	5,2	6,9	8,5	8,4	8,7
Latvia	7,7	6,0	9,7	8,8	7,3	10,9
Lithuania	3,4	2,3	4,8	6,3	5,3	7,3
Luxembourg	17,4	16,9	17,9	26,8	:	:
Hungary	2,7	2,3	3,2	3,0	:	:
Malta	7,2	:	:	13,2	:	:
Netherlands	17,1	15,0	19,4	29,1	26,7	31,3
Austria	21,6	18,9	24,8	19,7	16,2	24,2
Poland	4,1	2,9	5,3	6,6	:	8,4
Portugal	12,4	10,6	14,2	18,0	16,0	19,6
Romania	2,8	:	3,8	:	:	:
Slovenia	13,1	10,8	15,4	18,7	16,8	20,8
Slovakia	1,1	:	1,6	:	:	:
Finland	18,5	14,9	22,8	25,9	24,4	28,1
Sweden	45,6	42,1	49,7	51,3	46,3	56,3

Source: processing according to data published by EUROSTAT, 2025

For the total unemployed persons, as well as for male persons, the situation is similar to that found for Employed persons. And for these persons, the highest values were in: Sweden, Denmark, Netherlands. From the data available on the Eurostat website, for female unemployed persons, in 2023, high values were: Sweden (56.3%), Denmark (36.0%), Estonia (32.4%).

For the economic and social development of a community, it is important that the population has the highest possible level of training. Thus, the following table presents the Comparative Situation of the share of the adult population with tertiary education attainment, for the period 2013-2023, for persons aged between 25 and 64 years.

Table 4 - Situaţia comparativă a ponderii populaţiei adulte with tertiary education attainment (%), 2013-2023.

Countries	2013			2023		
	total	male	female	total	male	female
European Union	27,1	25,6	28,5	35,1	32,2	38,0
Belgium	35,5	32,8	38,3	44,8	40,3	49,4

Countries	2013			2023		
	total	male	female	total	male	female
Bulgaria	25,6	20,0	31,2	30,5	24,4	36,7
Czechia	20,5	20,0	21,0	27,0	23,5	30,8
Denmark	35,2	30,1	40,4	42,9	36,4	49,4
Germany	28,6	30,8	26,4	33,3	35,1	31,5
Estonia	37,4	28,3	46,0	41,6	30,4	52,8
Ireland	42,6	38,9	46,2	54,5	50,8	58,2
Greece	27,4	27,3	27,5	34,3	31,9	36,7
Spain	33,7	32,0	35,4	41,4	37,9	45,0
France	32,1	30,0	34,0	42,4	39,1	45,6
Croatia	20,9	18,8	22,9	28,7	24,1	33,2
Italy	16,4	14,5	18,2	21,6	18,3	24,9
Cyprus	39,3	37,4	41,0	50,7	46,9	54,2
Latvia	31,0	23,0	38,2	39,2	29,8	48,0
Lithuania	35,2	28,3	41,5	46,4	38,0	54,5
Luxembourg	40,7	41,9	39,4	51,9	50,8	53,0
Hungary	22,6	19,5	25,6	29,8	24,9	34,8
Malta	19,6	19,1	20,1	33,2	29,8	37,4
Netherlands	33,9	34,8	33,0	44,3	42,6	45,9
Austria	20,6	22,3	18,9	36,6	36,3	36,9
Poland	25,8	21,4	30,0	37,9	31,3	44,6
Portugal	19,3	15,3	23,1	29,8	24,9	34,3
Romania	15,6	15,0	16,1	18,6	16,6	20,6
Slovenia	27,9	22,7	33,3	33,8	25,9	42,4
Slovakia	19,9	17,9	21,9	28,8	24,4	33,2
Finland	40,5	34,1	47,1	42,6	35,1	50,4
Sweden	37,0	31,2	43,0	49,4	42,3	56,8

Source: processing according to data published by EUROSTAT, 2025

Compared to 2013, in 2023, in 11 of the 27 countries of the European Union, the share of people aged 25 to 64 with tertiary education attainment increased by more than 10%. At the European Union level, this indicator showed that 35.1% of the population had tertiary education (level 5-8). In 2023, values of more than 45% were recorded in: Ireland (54.5%), Luxembourg (51.9%), Cyprus (50.7%), Sweden (49.4%), Lithuania (46.4%). For males, in 2023 compared to 2013, only in 4 countries did the values increase by more than 10% (Austria, Ireland, Sweden, Malta). In 2023, for males, values over 40% were recorded in: Ireland (50.8%), Luxembourg (50.8%), Cyprus (46.9%), Netherlands (42.6%), Sweden (42.3%), Belgium (40.3%). For males, the lowest values of this indicator were in: Romania (16.6%), Italy (18.3%). In 2023, over half of females aged 25 to 64 had tertiary education attainment in: Estonia (52.8%), Ireland (58.2%), Cyprus (54.2%), Lithuania (54.5%), Luxembourg (53.0%), Finland (50.4%), Sweden (56.8%). The lowest values of this indicator were in: Romania (20.6%), Italy (24.9%). Compared to 2013, in 2023, 14 countries had values over 10% higher.

Field of education is important when considering the development of a sector of activity or another. At the European Union level, for the year 2022, the following figures present

the distribution of the number of bachelor's, master's and doctoral graduates by field of education.

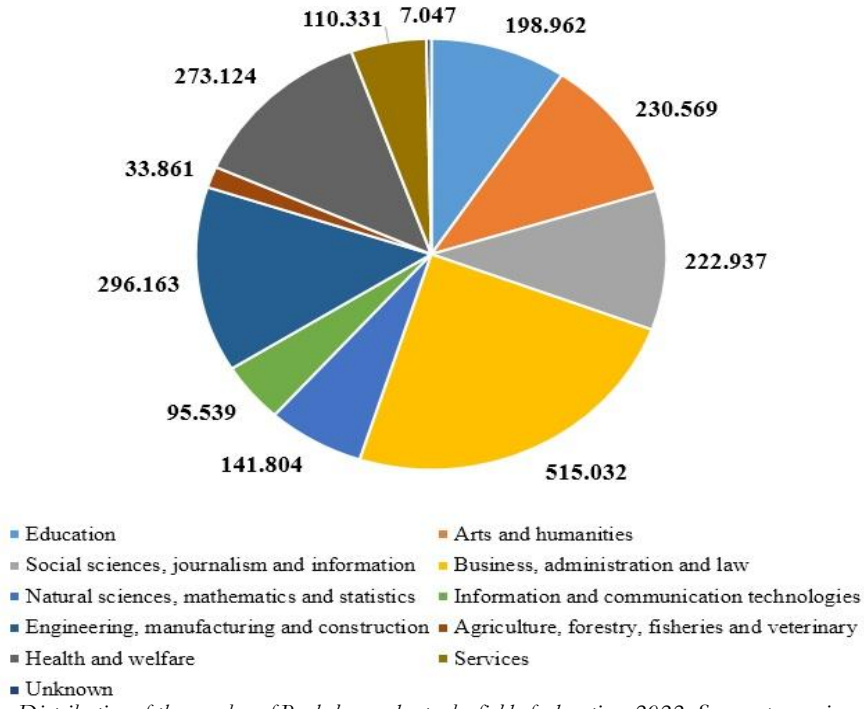

Figure 1 - Distribution of the number of Bachelor graduates by field of education, 2022. Source: processing according to data published by EUROSTAT, 2025

In 2022, at the European Union level, the highest number of graduates were in the field of Business, administration and law (515032), followed by the field of Engineering, manufacturing and construction (296163). Over 200000 graduates also had the fields of: Health and welfare (273124), Arts and humanities (230569), Social sciences, journalism and information (222937).

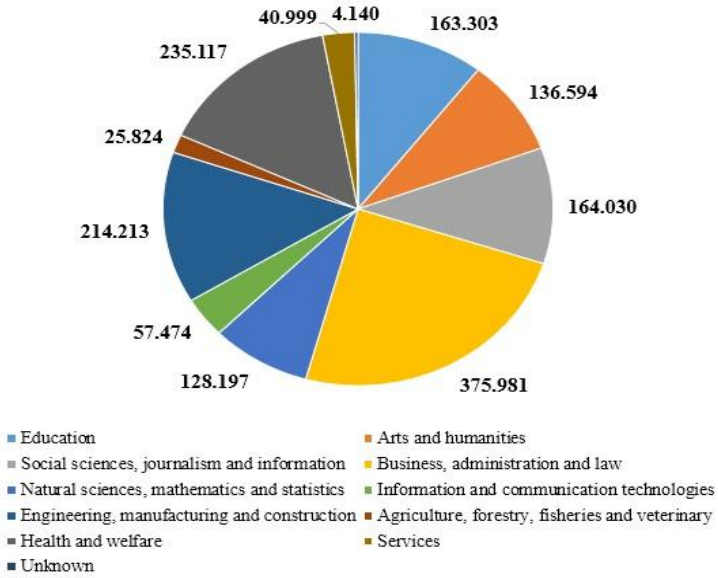

Figure 2 - Distribution of the number of master's graduates by field of education, 2022. Source: processing according to data published by EUROSTAT, 2025

In 2022, the fields in which the number of graduates was high (with over 200000 graduates per field) are: Business, administration and law (375981), Health and welfare (235117), Engineering, manufacturing and construction (214213).

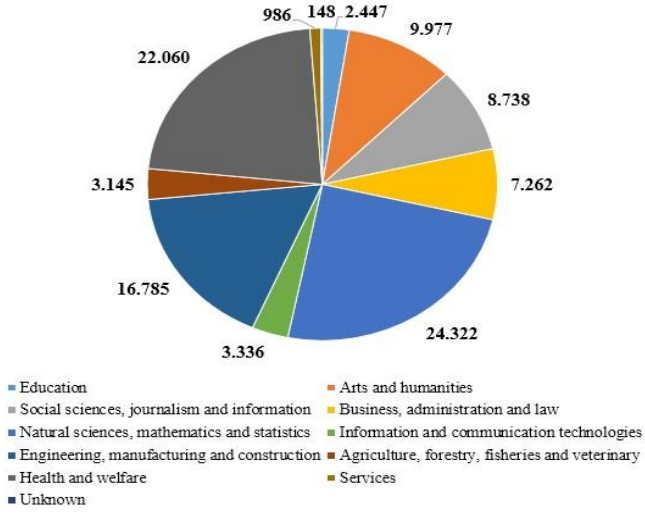

Figure 3 - Distribution of the number of doctoral graduates by field of education, 2022. Source: processing according to data published by EUROSTAT, 2025

For doctoral studies, the fields with the most graduates (over 10000 graduates per field) in 2022 were: Natural sciences, mathematics and statistics (24322), Health and welfare (22060).

Table 5 - Comparative situation of the shares of graduates according to the level of education completed, 2022. Source: processing according to data published by EUROSTAT, 2025

Field of education	Bachelor	Master	Doctoral
Education	9,4	10,6	2,5
Arts and humanities	10,8	8,8	10,1
Social sciences, journalism and information	10,5	10,6	8,8
Business, administration and law	24,2	24,3	7,3
Natural sciences, mathematics and statistics	6,7	8,3	24,5
Information and communication technologies	4,5	3,7	3,4
Engineering, manufacturing and construction	13,9	13,9	16,9
Agriculture, forestry, fisheries and veterinary	1,6	1,7	3,2
Health and welfare	12,9	15,2	22,2
Services	5,2	2,7	1,0
Unknown	0,3	0,3	0,1

In 2022, the highest shares for bachelor's and master's degrees were recorded for the field of business, administration and law, and for doctoral studies the highest values were for the field of natural sciences, mathematics and statistics.
Also, regardless of the level of education, high values of the share of graduates were recorded for the field of engineering, manufacturing and construction, respectively for the field of health and welfare.

5. Conclusions

Learning processes influence the experiences and outcomes of adults. Flexible educational systems allow for easier adaptation of individuals to their needs (Brandi et al., 2025).
Following the analysis carried out, it is observed that, for the total population aged 25 to 64, in 2023 compared to 2013, the participation rate in education and training increased in most member countries of the European Union. Regardless of the status of Employed persons or unemployed persons, in 2023, the highest values were recorded in: Sweden and Denmark.
At the level of the European Union, in 2023, over a third of people aged 25 to 64 had tertiary education attainment. In 2023, over half of male people aged 25 to 64 had tertiary education attainment in: Ireland and Luxembourg. In the same year and for the same age group, over half of the female population had tertiary education attainment: Estonia, Ireland, Cyprus, Lithuania, Luxembourg, Finland, Sweden. Regardless of gender, the lowest values were recorded in: Romania and Italy, where approximately one in five people has tertiary education attainment.
Also, for bachelor's and master's degrees, in 2022, at the European Union level, most graduates were in the field of: Business, administration and law, followed by the field of Engineering, manufacturing and construction, respectively by the field of: Health and

welfare. In the case of the doctorate, most graduates were in the fields of: Natural sciences, mathematics and statistics, respectively Health and welfare.
It is necessary for the academic environment to adapt to the changes occurring in the labor market. The increasing degree to which businesses and universities collaborate means that, regardless of the economic sector, students acquire the skills required in the workplace (Angheluţă et al., 2021).

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